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STEM RUST

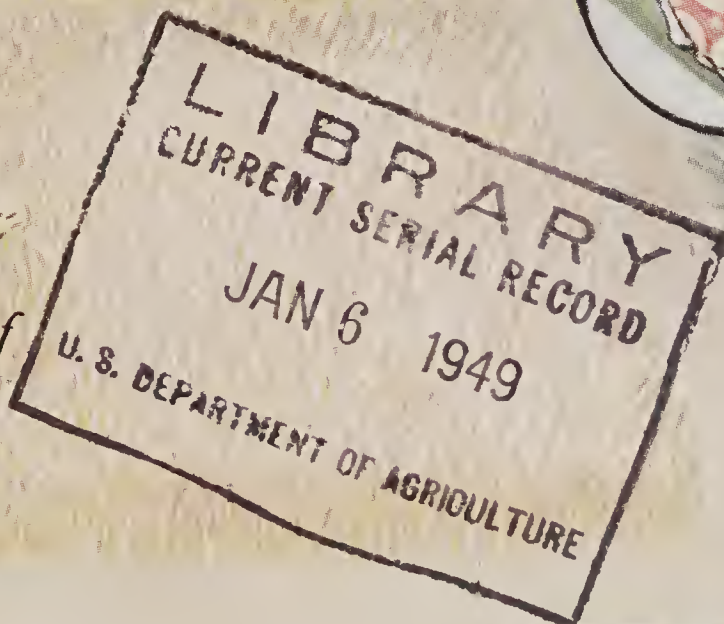
(See other side for
life history and control)

WHEAT

OATS

BARLEY

RYE



Wheat From Rust-Infected Plants



Wheat From Rust-Free Plants

a. Germination of overwintered black teliospores; *b.* sporidia or secondary spores (arrows) that infect susceptible barberry bushes; *c.* pycniospore or sexual stage on upper surface of barberry leaf; *d.* aeciospore or cluster-cup stage on lower surface of barberry leaf; *e.* urediospore or red stage on grain stem; *f.* teliospore or black stage on grain straw. (All greatly enlarged.)

STEM RUST AND THE BARBERRY

(*Puccinia graminis* Pers.)

LIFE HISTORY

The stem rust disease of wheat, oats, barley, and rye is one of the most destructive of all the fungus diseases that attack small grains. Every year it reduces the yield and quality of these crops in some areas. In epidemic years it has caused losses in the United States of more than 180,000,000 bushels of grain.

In some areas, the fungus lives part of its life on grains and grasses and part on certain barberries. During the life cycle it produces several distinct kinds of tiny, seedlike spores. Spores scattered by the wind transmit the fungus from one host plant to another. There are several varieties and numerous races of the stem rust fungus, which differ in their ability to attack the different kinds and varieties of grain.

In the northern half of the United States stem rust overwinters on wild grasses and grain straw in the black, or teliospore, stage. The overwintered teliospores germinate in the spring, producing sporidia, or secondary spores, which infect the leaves of rust-susceptible barberries. These spores cannot infect grains and grasses. When the fungus becomes established on the barberry, the pycniospore, or sexual stage, appears on the upper surface of the leaf. In this stage, hybridization may take place between different races. Occasionally new races of the fungus are thus produced, which can attack varieties of grain previously considered resistant. The aeciospore, or cluster-cup, stage is produced on the under side of the infected barberry leaves. These spores infect nearby grains and grasses, on which the red urediospore, or repeating stage, of the fungus develops. Under favorable weather conditions several generations of red spores may develop on grains or grasses during a single season. Myriads of these spores are carried by the wind from plant to plant and from grainfield to grainfield throughout the growing season. As the infected grains and grasses mature, the black, or overwintering, spores develop, and the life cycle is completed.

In the South, the rust may overwinter on grains or grasses in the red, or repeating stage and spread north as the season advances. Rust from this source spreads to grainfields in the North somewhat later than that from the barberry, and under weather conditions favorable for rust development may cause widespread damage.

CONTROL

The United States Department of Agriculture is cooperating with State agencies in the eradication of rust-susceptible barberries to control the stem rust disease of small grains. The removal of these bushes eliminates early-spring sources of stem rust inoculum and destroys the plants on which races of the fungus breed. There are many species and varieties of barberries. Most of them are susceptible to stem rust, but a few are immune or highly resistant. This disease is controlled by the following methods:

1. *Use chemicals to destroy rust-susceptible barberries.*
 - (a) Apply common crushed rock salt around the crown of each barberry. About 10 pounds is needed to kill a 5-foot bush.
 - (b) Where the use of salt may endanger livestock or poultry, treat the crown of a 5-foot barberry with about 1 gallon of kerosene to kill the bush.
 - (c) Ammonium sulfamate or 2,4-dichlorophenoxyacetic acid (2,4-D) may be used to kill barberries. The canes are cut off at the crown and the freshly-cut surfaces treated with small amounts of chemical in concentrated form. Only experienced persons should use this method.
2. *Use approved rust-resistant varieties of grain.*

Plant breeders have produced varieties of small grains highly resistant to the common races of stem rust. Follow the recommendations of your State experiment station in the selection and planting of these varieties.
3. *Use approved cultural practices.*

On areas where stem rust is a serious problem, sow spring grain crops early and use early maturing varieties. Grain that matures early may escape serious damage from stem rust. Winter crops should be sown according to recommended seeding dates.

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